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Measuring the gap between projected and perceived destination images of Catalonia using compositional analysis

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ABSTRACT

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KEYWORDS

Destination image; multiscalar destination; image gaps; image components; projected image; perceived image; compositional distance

INTRODUCTION

For many decades, tourist destination image (TDI) has been a recurrent subject of study in the literature of travel, tourism and hospitality (Chon, 1990; Li, Ali, & Kim, 2015; Pike, 2002; Stepchenkova & Mills, 2010; Tasci, Gartner, & Tamer Cavusgil, 2007). The core words that have been used to define its nature are, in order of frequency: impression, perception, belief, idea, representation, and feeling (Lai & Li, 2016); for instance, Crompton (1979) defines the TDI as “the sum of beliefs, ideas, and impressions that a person has of a destination” (p. 18). However, Lai and Li (2016), after an exhaustive literature review, propose a much more elaborate definition of TDI: “A voluntary, multisensory, primarily picture-like, qualia-arousing, conscious, and quasi-perceptual mental experience held by tourists about a destination. This experience overlaps and/or parallels the other mental experiences of tourists, including their sensation, perception, mental representation, cognitive map, consciousness, memory, and attitude of the destination” (p. 1074).

The overall TDI is formed by two interrelated components (Baloglu & McCleary, 1999): cognitive, involving the basic processes whereby the individual knows his environment, and affective, involving emotions and feelings about this environment. A third component, conative, is derived from the previous two involving acting, doing or striving in response to both (Agapito, Oom do Valle, & da Costa Mendes, 2013; Gartner, 1993; Rapoport, 1977). Most authors have taken into account this cognitive-

affective dichotomy to analyse the TDI (Kim & Perdue, 2011). However, tourists' activities tend to be spatially oriented in destinations (Lee, Hitchcock, & Lei, 2017), and other authors have emphasised, mainly in the field of Tourism Geography, the spatial aspect of the image. In this vein, Lynch (1960) asserted that "the image must include the spatial or pattern relation of the object to the observer and to other objects" (p. 9). Furthermore, Pocock and Hudson (1978) considered that the elements or attributes were not enough by themselves to know the urban structure: "The urban image is acquired and sustained by an underlying network representing the individual's movement field or activity space" (p. 52). These authors proposed the designative rather than the cognitive component. The designative component is informational in nature, regarding the description and classification, and considers two aspects of the cognitive image: Structure/physical qualities ("whatness") including shape, size, texture, colour and arrangement (Lynch, 1960), and spatial features ("whereness") including relative location, distance, and directional relationships (Pocock & Hudson, 1978). As an example of the few studies in the tourism field based on the spatial aspect of the image, we can mention Son (2005), who uses mental mapping techniques to measure the TDI; Stepchenkova & Zhan (2013), who use geo-maps representing projected and perceived images of Peru, and the territorial distribution of the pictures; and Marine-Roig & Anton Clavé (2016b), who analyse the territorial specialisation of the TDI through spatial coefficients.

From the perspective of the actors in the process of building the image, place marketing literature studies two types of TDI —projected and perceived— and the relations between them (Kotler, Haider, & Rein, 1993). Projected images can be considered as the ideas and impressions of a place that are presented for people's consideration, and the perceived images as a result from the interaction between these projected images and the visitor's own personal characteristics (Bramwell & Rawding, 1996). Traditional research methods on the contrast between the projected and the perceived TDI have primarily been based on quantitative analyses of data obtained through visitor surveys conducted to capture perceived destination image, and through secondary information sources, mainly official (NTO: National tourism organisation) and promotional (DMO: Destination marketing organisation) sources, in order to obtain the projected image (Andreu, Bigné, & Cooper, 2000; Bui, 2011; Farmaki, 2012; Grosspietsch, 2006; Ji & Wall, 2015; Meneghello & Montaguti, 2016; Önder & Marchiori, 2017). In recent years, the proliferation of user-generated content through social media has encouraged researchers (Chen & Law, 2016) to study perceived image through cost-effective, unsolicited, and unbiased travel-related UGC online sources, such as websites hosting photos and videos (Stepchenkova & Zhan, 2013), and travel blogs or online travel reviews (OTRs) (Chen, Yung, & Wang, 2008; Khan, 2013; Mak, 2017; Marine-Roig & Anton Clavé, 2016a).

According to the typologies of the various TDI formation agents (Camprubí, Guia, & Comas, 2013; Gartner, 1993), secondary information sources can be classified in a simplified way as organic (received from individuals), induced (emanating from destination promoters) and autonomous (independently produced), although the mutual exclusivity of these three agents cannot be assured (Tasci & Gartner, 2007). Gartner (1993) makes an estimation of the credibility, market penetration, and

destination cost of the different types of sources; however, it is crucial to know which information sources current vacationers consider most important when making decisions about their travel plans. Hence, Llodrà-Riera, Martínez-Ruiz, Jiménez-Zarco & Izquierdo-Yusta (2015), in a survey of 541 tourists and residents of Mallorca gathered online in 2013, identify as organic sources: “Friends and acquaintances”, followed by “Web pages with assessments by users”; induced sources: “Web pages of official tourist information”; and autonomous sources: “Travel guides”, that appear especially useful. These results are consistent with those obtained by Eurobarometer (2016), when about 30,100 respondents from different social and demographic groups of the European Union were interviewed in January 2016 about their preferences towards tourism. Concerning secondary information sources, the majority considered organic sources as the most important: “Recommendations of friends, colleagues or relatives”, followed by “Websites collecting and presenting comments, reviews and ratings from travellers”; in second position, induced sources: “Websites run by service provider or by destination”, followed by “Counters of travel agencies and tourism offices”; and, finally, autonomous sources: “Paid-for guidebooks and magazines”, which grew two points in relation to previous surveys. Conversely, in a sample of 196 respondents from Hong Kong about the influence level of various information sources, “Travel guidebooks” appeared in first place, followed very closely by “Friends and relatives”, and “Tourist offices” ranked last because respondents considered that it had low influence in their itinerary and decision making (Tsang, Chan & Ho, 2011). In another survey of 11,400 foreign tourists in Britain carried out by VisitBritain (2017) in spring 2016, on the 30 key influences on choosing a holiday destination, the results were: “Talking to friends/family” (1st), “Websites providing traveller reviews of destinations” (4th), “Travel guidebooks” (7th), “Travel agent or tour operator website” (8th), “Travel blogs/forums” (10th), “Official tourist websites” (15th), and “Official tourist brochures for the country/city/region” (16th). A survey of 2010 North-American travellers in 2016 on 15 technologies or services used to help plan a leisure trip (Statista, 2017) obtained: “User-generated content” (1st), “Print resources” (4th), “Opinions of friends, colleagues or relatives” (6th), “DMO website” (7th), and “Travel agent” (12th). Finally, a survey of 270 international tourists in Turkey on travel information source selection (Yasin, Baghiro, & Zhang, 2017) yielded disparate results for the various segments (travel experience, genre and age) of the sample. In summary, these surveys do not display unique results on image-building agents, but a preponderance of organic sources can be deduced: “Recommendations of friends, colleagues or relatives” (WoM: word-of-mouth marketing) and “Websites collecting and presenting comments, reviews and ratings from travellers” (eWoM: electronic WoM communication). In addition, the recent and dramatic increase in the creation and use of the latter has been especially remarkable (Marine-Roig, 2017).

In relation to TDI, the issue of representative dissonance (Bandyopadhyay & Morais, 2005) and destination image congruency (Bui, 2011) between information sources has been a subject of interest for the influence they may have in destination image formation. Concerning the issue of congruency, it is generally accepted that the closer projected and perceived images are, the better. Indeed, marketers intend to match, to the greatest possible degree, the projected and perceived images (Mackay & Fesenmaier, 1997). In a branding context, harmony and alignment between projected

brand attributes and brand image perception are essential to creating a strong relationship of the customer to the brand (Kim & Lehto, 2013). Thus, in general, achieving congruency between destination images is a key goal for destination promoters and marketers who then intend to assess whether the destination image they project has been conveyed to and assimilated by tourists (Ji & Wall, 2015) into their images of the destination. This affirmation could be extended to suggest that congruency is also desirable with other sources of information that can influence tourists. Beyond marketing purposes, image dissonance or congruency has been related to socio-political, identity and economic issues (Anton Clavé, 2010; Bandyopadhyay & Morais, 2005; Dinnie, 2008). In this sense, NTOs and DMOs need to calculate the incongruence between projected and perceived images to improve the supply and promotion of the destination (what gets measured gets managed), but, no study has been found to actually quantitatively assess the gap between the TDI of different sources.

Hence, the aim of this paper is to quantify the (in)congruency between the two sides of TDI (supply-side projected and demand-side perceived image). To do it, we propose a methodological approach to measure the TDI differences within various key information sources, based on an appropriate quantitative technique which allows for the comparison of proportions and data carrying relative information, called Compositional Analysis (Aitchison, 1986). The proportions of contents are the key interest, since it is obvious that longer websites or documents or more active media will have more content of everything and of every type, so that what matters is in which proportion a specific content (e.g. keyword) appears. At the first impression, the idea would be to compute the differences between proportions directly (subtracting percentages), however this does not make sense because when taking into account proportionality, the distances between the pairs of proportions 0.01 and 0.10 and 0.51 and 0.60 are not mutually distant as Euclidean distance considers. Bearing this in mind, a distance between proportions was defined by Aitchison (1986). It considers that the distance between 0.01 and 0.10 is 900% and the distance between 0.51 and 0.60 is less than 20%. Results derived from the direct subtraction between proportions are non-precise and confusing. Aitchison's distance will be the actual gap between projected and perceived images, and it will also allow knowing which components contribute more to differentiate the information sources.

To test this methodological approach, we select a sample of the previously mentioned secondary information sources, which represents the three TDI formation agents (organic, induced and autonomous), and we analyse their content in order to assess the (in)congruence between projected and perceived image in a multiscalar destination (Marine-Roig & Anton Clavé, 2016b), focusing on the most frequent keywords used, the spatial component of image (Pocock & Hudson, 1978), and two evaluations (perceptual/cognitive and affective) which compose the overall TDI (Baloglu & McCleary, 1999).

The article is structured as follows. It first presents a literature review about destination image formation, destination representative dissonance, and **projected vs. perceived** image congruency. It next describes the data and the methodological

approaches, including destination choice, information sources selection, data collection and methods of analysis. Afterwards, it provides the results of the TDI components and image gaps, and the last section concludes and discusses both theoretical and managerial implications.

THEORETICAL BACKGROUND

Destination image is a complex social construct, resulting from the two-way mutual influence of projected (supply-side) and perceived (demand-side) images. Projected destination image (supply-side) is embodied in specific representations, propelled and formed by different types of stakeholders with specific purposes, which are usually intended for the tourist and are perceived by him/her; then, the tourist (demand-side) feeds back on and influences the image construction circle by reproducing those images or creating new ones, and the global destination image results from the sum and interaction of all these images (Marine-Roig, 2015), thus closing the hermeneutic circle of image (Caton & Almeida Santos, 2008). In this context, the agents or stakeholders propelling tourist images are usually associated with certain travel information sources which tourists use.

TDI information sources

Phelps (1986) distinguishes between primary and secondary place images. The primary image comes from the own experience of the visitor or resident. Secondary images emanate mainly from stakeholders and prior visitors of the destination. Gartner (1993), in his foundational work, created a classification of tourist information sources ranging from the sources in which the destination has the most control over what is presented to that over which the destination has the least control (i.e., from secondary to primary sources), building on the premise that information will be most credible and influential to tourists the less controlled it is by destination stakeholders or the economically interested: 1. Overt Induced: a) traditional forms of advertising mainly proceeding from DMOs, and b) information from tour operators or travel agents. 2. Covert induced second party endorsement: a) via traditional forms of advertising, or b) through apparently unbiased reports; 3. Autonomous: news and popular culture such as documentaries, films, magazines, travel guides or guidebooks not controlled by destination managers or stakeholders; 4. Organic information coming from friends and relatives through word-of-mouth both a) unsolicited, and b) solicited; and 5. Tourists' previous experience or actual visitation.

Despite the variety of information sources described by Gartner (1993), Camprubí and Coromina (2016) found that only 7.9% of researches use more than one object of analysis. Concerning the objects of analysis, among 164 reviewed studies using content analysis, these authors found that 6.7% analysed promotional materials and brochures, 5.5% analysed newspapers and press articles, and only 4.9% examined storytelling, comments and customer reviews. In addition, out of 690 keywords, 9.3% referred to the demand side, 6.7%, to the supply side, and 6.4%, to the TDI. Furthermore, very few researchers have used information sources representative of all of the different TDI formation agents (organic, induced and autonomous), such as

Choi, Lehto, and Morrison (2007) who analyse a sample of 61 websites, including Macau NTO, 12 magazines, 15 travel guides, 20 travel trade stakeholders, and 14 travel blog websites; and Krizman Pavlovic and Belullo (2007) who analyse a sample of 39 websites including Istrian NTO, 13 travel guide, 8 travel magazine, 8 travel trade, and 9 travel blog websites. Regarding the TDI represented online, the authors of both studies found a clear level of dissimilarity across the different travel-related websites.

Almeida Santos and Buzinde (2007) explain that the ability of representations to create meaning is crucial to defining and constructing the identities of a place and to understanding its culture and cultural capital. Nonetheless, Beerli and Martín's (2004) results indicated that for first-time travellers to a particular destination, the induced sources such as brochures created by the destination and tour operators of the destination, as well as advertising and the Internet, had no significant influence on the cognitive image. The only induced source that had any significant influence was travel agents. Organic and autonomous sources, as well as WoM, also had a significant influence on the destination's image. Otherwise, according to Gartner's (1993) framework, WoM is the most trusted information source by tourists after their own previous experience. Moreover, interpersonal influence and WoM are the most important sources of information in consumer decision-making (Litvin, Goldsmith, & Pan, 2008).

However, today, most authors agree on the importance of the Internet as a travel information source (Llodrà-Riera et al., 2015; Xiang, Wang, O'Leary, & Fesenmaier, 2015). In online environments, eWoM communication has proven to be highly credible and trustworthy (Dickinger, 2011) for other users seeking advice. In addition, eWoM has a significant impact on destination choice and travel experience (Jalilvand & Samiei, 2012; Yan, Zhou, & Wu, 2018); it positively influence on the TDI, attitude towards the destination, intention to travel and, thus, in the tourists' decision-making process (Jalilvand et al., 2012); and it has an indirect effect on satisfaction and loyalty mediated by destination image (Setiawan, 2014), since the TDI impacts both attitudinal and behavioural loyalty (Zhang, Fu, Cai, & Lu, 2014). Therefore, DMOs have created their online websites and channels, travel agents and guidebooks have also gone online and, most importantly, web 2.0 has enabled the massive creation of UGC on which other users rely.

In the field of tourism and hospitality, traveller-generated content (TGC: mainly travel blogs and OTRs) is of the utmost interest for destination managers as they embody tourists' perceptions of the tourist experience; however, at the same time, they have become a very influential information source for other tourists who read them online (Jalilvand, Samiei, Dini, & Manzari, 2012). We could consider this a perceived image that is purposely posted to be projected to other users. In this respect, TGC has been found to be very trustworthy to other users who read it because it consists of other peers' free and uninterested assessments and opinions about places, products or services, and it highly influences tourists' decision-making (Ayeh, Au, & Law, 2013; Fotis, Buhalis, & Rossides, 2012; Schuckert, Liu, & Law, 2015).

The use of TGC for conducting tourism research has dramatically increased in recent years (Lu & Stepchenkova, 2015) due to the multiple advantages they present to analyse such aspects as tourist satisfaction (Liu, Teichert, Rossi, Li & Hu, 2017), online reputation (Baka, 2016), marketing issues (Pantano, Priporas, & Stylos, 2017), or destination image (Kladou & Mavragani, 2015), thanks to the massive amount of information available and to their spontaneous and unbiased nature, without laboratory effects like traditional surveys (Schuckert et al., 2015; Xiang, Du, Ma, & Fan, 2017).

In this respect, TGC transmitted through eWoM is at the same time the reflection of the perceived image of the destination, an elaborate recount of the travel experience intended to be read by and transmitted to others, and a very powerful information source for other tourists (Eurobarometer, 2016; Llodrà-Riera et al., 2015; Statista, 2017; VisitBritain, 2017). TGC can be considered as an organic information source, because although it reflects tourists' perceptions, it is intended to be read by a public, and although the user may not know the other users involved, the information they recount is considered trustworthy and unsolicited, with no economic interest involved (Baka, 2016). Thus, tourists, as organic agents, have become prominent agents of image projection (Camprubí et al., 2013). Therefore, TGC disseminated through eWoM communication can be included in Gartner's (1993) classification as an unsolicited-organic image formation agent (Marine-Roig, 2017).

Due to the growing influence of TGC as an information source for tourists' decision-making and destination image formation, through the so called eWoM effect (Leung, Law, Van Hoof, & Buhalis, 2013; Litvin et al., 2008), it becomes crucial for destination managers to assess how the destination is being represented (online) by tourists, and moreover, whether the (online) image perceived and transmitted by tourists corresponds to the image that the DMO or other influential stakeholders are projecting.

Destination representative dissonance and image congruency

The issues of destination representative dissonance and image congruency have been empirically researched since the beginning of the century (Table 1), the first focusing on the various representations of a destination by different information sources and stakeholders, and the second mainly on the similarity of projected images to tourists' actual perception. In this context, assessing dissonance between different representations of a destination or congruence between projected and perceived images becomes a basic task for NTOs and DMOs.

Concerning representative dissonance, destination promoters tend to symbolically distort reality to fit their economic interests when communicating the TDI to prospective visitors (Hummon, 1988) and produce discrepancies between representation and reality. Representative dissonance assumes that various agents project different representations which may be closer to or further from this reality for manifold purposes. Table 1 shows 3 papers on representative dissonance in the case of India. The first two (Bandyopadhyay & Morais, 2005; Chhabra, 2012) found that the

Indian government's self-representations are partly aimed at attracting visitors from the West, because they tend to mystify India and project it as a place of simplicity, rurality, timelessness, and remaining untouched. The third (Garrod & Kosowska, 2012) notes that dissonances of representation between the two analysed sources harm the destination image.

Table 1. Sample of papers on representative dissonance (RD) and image congruency (IC).

	Induced	Autonomous	Organic (primary and secondary)
01.RD	Indian government	American media	
02.RD	Official tourism websites vs. Indian travel magazines		
03.RD	Holiday brochures	Travel guidebooks	
04.IC	Official promotional campaigns		Survey of 120 British tourists
05.IC		Media	Survey of 397 visitors
06.IC	Survey of 42 tour operators		Survey of 508 visitors
07.IC	Vietnamese government		Survey of 43 foreign tourists
08.IC	Official promotional campaigns		Survey of 393 British tourists
09.IC	NTO website		Survey of 480 American travellers
10.IC	Official travel guides and brochures		Survey of 578 visitors
11.IC		Travel writings	Survey of 200 tourists
12.IC	DMO website of 8 US cities		Survey of 2153 American travellers
13.IC	106 DMO websites		232 travel blogs
14.IC	530 DMO images		500 Flickr images
15.IC	NTO website		100 travel blog comments
16.IC	10 NTO websites		46,576 travel blog and review entries
17.IC	321 photos and 49 NTO pages		1953 photos and 140 travel blog pages

References: 01:(Bandyopadhyay & Morais, 2005); 02:(Chhabra, 2012); 03:(Garrod & Kosowska, 2012); 04:(Andreu et al., 2000); 05:(Mercille, 2005); 06:(Grosspietsch, 2006); 07:(Bui, 2011); 08:(Farmaki, 2012); 09:(Kim & Lehto, 2013); 10:(Ji & Wall, 2015); 11:(Meneghello & Montaguti, 2016); 12:(Önder & Marchiori, 2017); 13:(Chen, Yung, & Wang, 2008); 14:(Stepchenkova & Zhan, 2013); 15:(Khan, 2013); 16:(Marine-Roig & Anton Clavé, 2016a); 17:(Mak, 2017)

Various studies have used the basic projected vs. perceived dichotomy to analyse tourism image congruency based on induced or autonomous sources and traveller surveys (Table 1, 04-12). Nonetheless, with growing quantities of valuable information on the Internet, DMOs are increasingly gathering online information, and especially customer feedback (UGC) with the aim of staying competitive by learning about destination image perceptions (Banyai & Glover, 2012) and related issues such as image congruency or gaps. In this respect UGC is an open window to tourists' perceptions as expressed during a post-trip stage in order to assess congruency. In spite of the latter, few studies focus on the analysis of tourists' perceived images and projected images simultaneously, and ongoing research is needed especially to identify image gaps between online user-generated contents (perceived image) and officially projected images to develop new techniques to improve online brand image (Pitt, Campbell, Berthon, Nel, & Loria, 2008). Currently, in an environment of generalized online communication, it is of great interest to assess congruency between perceived tourist images in the form of UGC and other online information sources, both destination-produced images and those produced by other influential stakeholders, because of the multiple implications this congruency may have.

A few studies have used online sources, including UGC (Table 1, 13-17), such as Chen, Yung, and Wang (2008) who compared the contents of blogs and various travel information to actually analyse the existing image perception gaps of Kaohsiung City (Taiwan) among domestic tourists, foreign tourists, and NTO travel information. Their results showed remarkable image gaps between the images held by foreign tourists and the official information on various topics (foreign bloggers were particularly concentrated on exotic features of local culture and gastronomy). From a visual perspective, Stepchenkova & Zhan (2013) compared the photographs of the DMO (projected image) and visitors (perceived image) of Peru. The results suggest that tourists are more interested in the daily lives of residents, while the DMO tends to promote distinctive features of Peruvian culture and traditions. From a visual and textual content analysis of travel blogs and Eastern Taiwan NTO website, Mak (2017) found similarities of representation in some categories such as natural environments and infrastructures (cognitive dimensions), and incongruences such as food and beverages (cognitive dimension) and pleasant qualities (affective dimension) that were underrepresented on the official website.

In summary, previous studies (Table 1) show that the images perceived by tourists do not usually coincide with the images projected by suppliers or DMOs. In this context, addressing and reducing these image gaps not only becomes a priority from a destination marketing perspective (Dinnie, 2008), but also from a cultural and economic standpoint, as they may influence the capacity to attract foreign investment and future travellers at the destination (Bui, 2011). In this respect, Govers and Go (2009) suggested the notion of “gap bridging” as a fundamental element in place brand analysis, which aims to address and reduce brand image gaps at different levels.

Although some studies have compared online tourism website information with UGC (Table 1, 13-17), quantitative studies with massive data sets using the potentialities of UGC for this comparison are still scarce. Moreover, although several studies have attempted to assess the destination image gaps, and most have found that gaps exist, no study has been found to actually quantify or measure the gap or distance between information sources, in relative terms, in order to compare more “different” or “closer” images from different information sources, or to assess the “closing” or “widening” of the gap.

Additionally, TDI congruency between projected and perceived images has been found to be partial and not homogeneous. It has been found to be stronger or weaker depending on the sources compared (Choi et al., 2007), or depending on various destination attraction factors (Chen et al., 2008). Usually, the method of comparison between different information sources involved the identification, in each source, of dominant themes and/or image attributes, followed by comparing them qualitatively and/or seeing if they are present or not (Andreu et al., 2000; Bandyopadhyay & Morais, 2005; Bui, 2011; Chhabra, 2012; Farmaki, 2012; Khan, 2013; Meneghello & Montaguti, 2016; Mercille, 2005), or quantitatively by determining how present they are in each source: Grosspietsch (2006) compares the values that visitors and tour operators give to 15 attributes, 3 open-ended questions and 9 statements; Chen et al., (2008) compare the frequency and ranking of destination attributes grouped into 9

categories; Kim and Lehto (2013) compare the ranking of destination personality attributes grouped into 7 personality dimensions; Stepchenkova and Zhan (2013) compare the territorial distribution of the photographs and the frequency of the images classified according to 19 attributes, as well as calculate incongruences by means of chi-square tests; Ji and Wall (2015) compare the frequency and ranking of 22 cognitive attributes; Marine-Roig and Anton Clavé (2016a) compare the site-wide density and average weight of keywords grouped into 8 categories; Önder and Marchiori (2017) compare the frequency of 12 topics displayed on both sources; and Mak (2017) compares the frequency of photographic and textual data grouped into 11 cognitive dimensions and one affective dimension.

In short, there are no researches in Table 1 which have worked on incongruities across the three sources (induced, autonomous and organic). Moreover, those that make calculations only present/display a list of attributes/categories by number of occurrences, percentage, and/or rankings, except for Stepchenkova and Zhan (2013) who calculated some incongruities (gaps) with the chi-square test and also worked the spatial aspect of the TDI. Thus, no research has been found to assess such TDI gaps between projected and perceived images in relation to destination image components (cognitive, affective and spatial) and none has measured such image component gaps quantitatively and comparably across different sources (induced, autonomous and organic). Therefore, it is the aim of this study to measure quantitatively TDI destination gaps and congruency, both globally and in relation to the TDI components across different information sources.

MATERIALS AND METHODS

The methodological proposal we present makes a novel contribution in the field of TDI because it systematically selects the most suitable information sources to unveil the projected and perceived TDI, discloses the impact of these sources over the tourist brands of a multiscalar destination (Marine-Roig & Anton Clavé, 2016b), extracts a sample of the spatial, cognitive, and affective components of image, and checks the congruency of everything, measuring the actual gap. The method uses keyword-frequency counts aggregated into categories, as well as, in the case of documents, calculates the area of the pages occupied by text or images directly related to one category. The quantitative analysis uses a large quantity of UGC data (80,000 OTR titles writing in English on Catalonia in 2015), which gives a great reliability to the results concerning perceived TDI by tourists.

Drawing from the most-used keywords, and the categories defined per each TDI component (spatial, affective and cognitive), we aim to compare the TDI within three information sources to quantify the gap between them. We first developed a list of keywords that varied from one source to another. So, since the volume is not comparable because the number of entries and pages analysed is different in each source, we are interested in relative sizes. That is, what matters in this case is the percentage of appearance of each keyword (or category) in each source. In statistical literature, this situation is known as compositional. Compositional analysis is used to analyse data carrying relative information. Furthermore, since we are interested in

comparing and computing the differences between information sources (autonomous, induced and organic), we use the compositional distance, also called Aitchison's distance (Aitchison, 1986), which is the appropriate way to differentiate amongst proportions.

Compositional Analysis

Proportions belong to the so-called compositional data and lie in a constrained space. A composition of D different contents measured on the Web (or document or media) i $x_{i1}, x_{i2}, \dots, x_{iD}$ has the following constraints: x_{id} must be between 0 and 1 (or 100, in %), and the sum must be equal to 1 (or 100, in %).

Aitchison (1986), and Pawlowsky-Glahn and Buccianti (2011) warn against the serious problems that arise when using standard statistical analysis tools on compositional data. Compositional data are non-normal (proportions are bounded while the normal distribution has the whole real range from $-\infty$ to $+\infty$) and heteroskedastic.

Compositional data carrying relative information can be transformed by means of logarithms of ratios, so that they can be subject to standard statistical techniques (Ferrer-Rosell, Coenders, & Martínez-García, 2016). Log-ratios have the twofold objective of making compositional data statistically treatable (recovering the whole unconstrained real space) and of getting the most from the relative information carried by the data. The simplest **compositional analysis** approach involves applying standard statistical techniques on logarithms of ratios of components. Several log-ratio transformations have been suggested in the early **compositional analysis** literature (Egozcue, Pawlowsky-Glahn, Mateu-Figueras, & Barceló-Vidal, 2003). The additive log-ratio transformation (alr) is the easiest to compute given that it is simply the log-ratio of each component to the last. The centred log-ratio transformation (clr) computes the log-ratios of each component over the geometric mean of all of the components, including its own. And finally, the isometric log-ratio transformation (ilr) is based on an interpretable sequential binary partition of components the researcher wishes to compare to one another, known as partition tree or dendrogram (V. Pawlowsky-Glahn & Egozcue, 2011). It must be noted that one dimension is lost in the alr while in the clr; one dimension is a linear combination of the remaining. In ilr, D components require $D-1$ log-ratios.

The alr is commonly used for statistical modelling and prediction of compositions, as well as the most extended and used ilr, which is more flexible regarding the research questions and easier to interpret. Conversely, the clr transformation is commonly used for statistical techniques which are based on a metric, such a cluster analysis or proportion comparison (Ferrer-Rosell & Coenders, in press), because of its preservation of distances. Thus, in this article, we use the centred log-ratio transformation (clr). Clr computation is straightforward and the Euclidian distances in the transformed space result equivalent (Aitchison, Barceló-Vidal, Martín-Fernández, & Pawlowsky-Glahn, 2000; Palarea-Albaladejo, Martín-Fernández, & Soto, 2012).

As mentioned, the clr transformation consists of calculating the log-ratios of each part over the geometric mean of all parts (each keyword), including itself. Once we have the log-ratio computed, Aitchison's squared distance between two compositions x and y assumes log-ratios carry all needed information about relative differences and see the differences between individuals for each log-ratio summing the squares. It is computed as:

$$d^2_a(\mathbf{x}, \mathbf{y}) = \sum_{i=1}^D \left(\ln \left(\frac{x_i}{(x_1 x_2 \cdots x_D)^{1/D}} \right) - \ln \left(\frac{y_i}{(y_1 y_2 \cdots y_D)^{1/D}} \right) \right)^2 = \sum_{i=1}^D \left(\ln \left(\frac{x_i}{g(x)} \right) - \ln \left(\frac{y_i}{g(y)} \right) \right)^2$$

To compare proportions, we consider each information source as a composition (x), and the keywords (and Catalan Tourist Board brands and other affective and cognitive categories) as the components or parts ($x_1, x_2, x_3 \dots x_D$) of the compositions. So that, log-ratios in the above expression compare each part (component) with the geometric means $g(x)$ and $g(y)$ of all parts (components).

This computation reveals which keywords (components in each composition x and y) contribute most to differentiating the information sources. For each pair of compositions (organic source versus autonomous source, organic source versus induced, and autonomous source versus induced) we will know which keywords contribute most to differentiating the pair of compositions. As mentioned before, keyword frequencies are at the basis of the analysis, as it is widely assumed that words that are mentioned most often are the words reflecting most concerns (Stemler, 2001).

Regarding the comparison of information sources with the most used keywords, we used a sub-composition consisting of the 50 most common words used in the three information sources. We drew from the 25 most-used keywords in each source, and then we unified the three sets by filling the gaps within each set. That is, we found 50 keywords commonly used in the three information sources.

Regarding the comparison of information sources with TDI components, we defined categories per each TDI component using all pages (in Lonely Planet and official dossier) and OTRs (in Trip Advisor) treated, and using Catalan Tourist Board brands for the spatial component, "feeling" words for the affective component and "Gaudi" related words for the cognitive component.

As in the keyword analysis, we are again interested in proportion of appearance of each category in each information source, because the number of entries and pages observed is very different in each source. For example, as shown in Table 4 (use of feeling words), in the Lonely Planet pages analysed there is only a 0.69% of feeling words used, while in Trip Advisor, 5.53% of words are feelings. Once we determined the percentages of appearance of each category, we computed the clr coordinates per each composition and then the Aitchison distance.

In order to be able to compare the differences found between information sources in each analysis, or in other words, distances lying in spaces of different dimensions, it is necessary to take into account the number of dimensions, which in Compositional Analysis is $D-1$. Thus, we divided the resulting squared Aitchison's distance by the number of dimensions ($D-1$ compositional components) included in each analysis. In the case of the keyword analysis, we had 50 keywords, so 49 dimensions. In the case of spatial analysis, we had 9 brands, so 8 dimensions, and so on.

The main limitation of the compositional analysis technique is the presence of zeroes, because when some component equals zero, neither the log-ratios nor the geometric mean can be computed (Martín-Fernández, Palarea-Albaladejo, & Olea, 2011). The occurrence of different content in web pages, media or documents, conforms to a particular case of compositional data which are called count compositional data. The common approach to dealing with count zeroes, and the one we have used, is a *Bayesian-multiplicative approach* (Martín-Fernández, Hron, Templ, Filzmoser, & Palarea-Albaladejo, 2015), which, according to the Monte Carlo experiment in Martín-Fernández et al. (2015), is the best replacement rule. This implies replacing zero counts with:

$$x'_{id} = \frac{1}{S_i + D}, \text{ for } x_{id}=0$$

Non-zero values must be reduced in order to preserve the unit sum as:

$$x'_{id} = x_{id} \left(1 - \sum_{x_{id}=0} x'_{id} \right), \text{ for } x_{id}>0$$

Since the computations are straightforward (based on geometric means, sums and subtractions) and we aim to decompose the Aitchison's distance variable to variable and have used Excel 2007. With this, we also aim to show the non-complexity of both the technique and the clr transformation. However, the "R-zcompositions" package for R software could also be used to compute the clr transformation, as well as for the zero replacement (Palarea-Albaladejo & Martín-Fernández, 2015; van den Boogaart & Tolosana-Delgado, 2013).

Destination choice

Catalonia has been chosen as the case study because it is an outstanding European destination (Eurostat, 2016). In 2015, it welcomed 22.2 million travellers (75.3 million overnight stays), more than three-quarters of whom came from abroad (OdEiO, 2016). Catalonia is a multiscalar destination (Marine-Roig & Anton Clavé, 2016b) the territory of which is divided into tourist brands (Figure 1). Each of these subregions groups bordering counties with homogeneous tourist offerings, and so the images of brands specialize themselves (Marine-Roig & Anton Clavé, 2016b), although any destination in Catalonia is managed and/or promoted by several DMOs across five territorial administrative levels (Datzira-Masip & Poluzzi, 2014).

Figure 1. Catalan tourist brands promoted by tourism boards



Tourist brand	Abbr.
Barcelona	<i>Barna</i>
Costa Barcelona	<i>cBarc</i>
Costa Brava	<i>cBrav</i>
Costa Daurada	<i>cDaur</i>
Paisatges Barcelona	<i>pBarc</i>
Pirineus	<i>Pyren</i>
Terres de l'Ebre	<i>tEbre</i>
Terres de Lleida	<i>tLlei</i>
Val d'Aran	<i>vAran</i>

Source: Authors (derived from CTB, 2015)

The capital of Catalonia is Barcelona, a leading smart city and prominent tourist destination. As shown in Fig. 1, Barcelona's brand is the smallest of the subregions in terms of surface, but it is the one which had major weight in 2015 in terms of number of inhabitants (2.2 million) and tourist influx (7.5 million) (IdEsCat, 2016).

Information source selection

The selection of the most suitable secondary sources for the case study (Catalan TDI throughout 2015) is based on the empirical works mentioned in the introduction (Eurobarometer, 2016; Llodrà-Riera et al., 2015; Statista, 2017; VisitBritain, 2017), within the theoretical framework proposed by Gartner (1993).

A) *Organic source.* The primary source is word-of-mouth information (recommendations of friends and acquaintances), to which we do not have access, followed by webpages with assessments by users (travel blogs and OTRs). This source of UGC, for the eWOM effect, impacts TDI (Jalilvand, Samiei, Dini & Manzari, 2012) and enables analysis of the perceived image by bloggers and reviewers. The selection of the most suitable webhost is based on a weighted aggregation of rankings, as suggested in previous works (Marine-Roig, 2014):

$$TBRH = 1*B(V) + 1*B(P) + 2*B(S)$$

Borda's (de Borda, 1781) count function (B), was applied to three lists of websites ranked according to metrics: web visibility (V: quantity and quality of incoming links), popularity (P: unique visitors, visits and traffic in general), and size (S: number of entries related to the case study). In turn, 'V', 'P' and 'S' are obtained through a weighted aggregation of rankings. 'V': indexed-pages and link-based rankings; 'P': visit-based rankings; and 'S': ranking of travel blog and OTR entries and ranking of media files. Based on three complete lists (L) of webs sorted by 'V', 'P' and 'S', function 'B' assigns a score to each candidate (c) consisting of the number of candidates below 'c'

in 'L'. This score is multiplied by the weight of each ranking. Once the partial scores have been added, the candidates are ranked in descending order of total scores. After the application, the most outstanding OTR webhost was TripAdvisor (TA). This selection coincides with that of many authors (Baka, 2016; de Rosa, Bocci, & Dryjanska, 2017; Liu et al., 2017; Pantano et al., 2017) who chose TA as a travel-related UGC source because of its advantages (Sotiriadis, 2017).

B) *Induced source*. As an umbrella of the information emanating from destination promoters, the CTB (2015) press pack issued by the Catalan Tourist Board was selected. This press dossier is published every year in six languages on the NTO website and is freely available to both users and professionals in the tourism sector. It contains structured and comprehensive information about Catalonia, the various tourist brands, the promoted products and services, and the main news and innovations of the year. Considering the high weight of the region's capital, we also included the BarcelonaTurisme (2014) press file containing newsletter items and which features all of the latest news about the city and those segments that are the focus of Barcelona Tourism's promotional initiatives. The official dossier contains tourist information about the attributes, attractions, accommodations, and experiences of the region, subregions and places, which represent to a great extent the projected image by the promoters of the destination. That is, in addition to being directly accessible for prospective visitors and stakeholders, both press dossiers are disseminated in the media.

C) *Autonomous source*. Travel guidebooks that do not depend on the promoters of the destination were selected as sources of autonomous information. Travel guidebooks have previously been used to analyse the image and identity of tourist destinations, as in Bender, Gidlow, & Fisher (2013) on Swiss stereotypes, Marine-Roig (2011) on Catalan coastal destinations, and Nelson (2012) on Slovene TDI construction. Among travel guides or guidebooks in English, Lonely Planet was selected because it is by far the most frequently mentioned guidebook in academic tourism literature (Peel & Sorensen, 2016) and the most popular among travellers (Bender et al., 2013; Meneghello & Montaguti, 2016; Mercille, 2005; Nelson, 2012; Tailanga, Ruenbanthoeng, Kuldilok, & Prasannam, 2016). The widespread availability and high reputation of Lonely Planet guarantees its autonomy in relation to induced sources.

Data collection

Once the most suitable information providers for the case study were selected (TripAdvisor, Catalan Tourist Board, and Lonely Planet), we proceeded to gathering data and converting into plain text:

A) *TripAdvisor* (TA). Following the method detailed in Marine-Roig (2017), we downloaded the OTRs on "Things to Do in Catalonia" (TripAdvisor, 2016), written in English in 2015. This section of TA is the one which allows for more accurate extraction of the perceived image of reviewers in relation to attributes, attractions and experiences of the destinations in a given region.

Next, we selected a random sample of 80,000 OTR titles. The OTR page title contains structured information which allows for the extraction of a sample of the affective, cognitive and spatial components of the TDI: On the one hand, it consists of the title written by the author, which synthesises the perceived image of a lived experience, and on the other, the webmaster added the name corresponding to the attraction, activity or service, and its location.

B) *Official dossiers* (OD). The files BarcelonaTurisme (2014) and CTB (2015) were downloaded in PDF format. Both files were merged in a single PDF file of 100 pages, which was converted to plain text.

C) *Lonely Planet* (LP). The Lonely Planet Spain travel guide was acquired in PDF format, and the chapters on Catalonia (Ham, 2014b) and Barcelona (Ham, 2014a) were extracted. The resulting file of 129 pages was converted to plain text.

Content analysis

In recent years, there has been a growth of studies in the field of tourism that have used content analysis as a research method (Camprubí & Coromina, 2016). Content analysis can be defined as a systematic, replicable technique for compressing data into a few content categories. It is usually based on a word-frequency count because, despite its limitations, it is assumed that the words that are mentioned most frequently are the words that reflect the greatest concerns (Stemler, 2001). That is, content analysis is basically a class of techniques for mapping symbolic data into a data matrix suitable for statistical analysis (Roberts, 2001, 2697). From a quantitative perspective, content analysis is a summarizing, quantitative analysis of messages that relies on the scientific method and is not limited as to the types of variables that may be measured or the context in which the messages are created or presented (Neuendorf, 2017).

Some lists were first prepared to set the parser: Composite words (groups of two or more consecutive words that have meaning as a whole), word separators (any character which is not a letter in Catalan, English or Spanish languages), and stop words (conjunctions, determiners, adverbs, pronouns and prepositions). Then, the parser splits, counts, and groups the keywords by categories.

Categories are groups of words with similar meaning and/or connotations, which are also independent, mutually exclusive and exhaustive (Stemler, 2001). Regarding these requirements, we constructed three subcategories representing the spatial, cognitive and affective components of image. These keyword categories were established prior to any preliminary analysis. The names of destinations and attraction factors that have accents were also included without accent because this is common practice among English bloggers / reviewers.

- **Brands.** To assess the spatial impact or spatial component of the TDI, the region was divided into 9 territorial subcategories (one per each tourist brand: Figure 1),

which collected brand name, counties, cities, towns, and other places considered destinations such as Montserrat (mountain range with a well-known monastery).

- **Tangible heritage.** The tangible heritage is by far the most predominant tourist theme in Catalonia (Marine-Roig & Anton Clavé, 2016a, 2016b). To analyse the perceptual or cognitive component of TDI, we constructed a tangible heritage subcategory (Gaudi's work) composed of the name of the architect Antoni Gaudi and of seven of his masterworks which were declared World Heritage Sites (UNESCO, 2005) such as the Basilica of La Sagrada Familia (Crypt and Nativity façade), Park Guell, and Casa Batllo. Destinations can select various cognitive categories or subcategories of interest for analysis. In this case, the specific element of interest of Gaudi's work was selected as the most representative sample of tourist attractions in Catalonia. That is, in January 2016 (TripAdvisor, 2016), TA hosted about 480,000 OTRs on the 4,500 attractions and services throughout the region, and only the three mentioned masterpieces totalled more than 120,000 OTRs. In addition, in 2015, there were 11,877,229 visits to areas of architectural interest in Barcelona, of which 9,049,984 were Gaudi's works (BarcelonaTurisme, 2016).

- **Feelings.** Feelings can refer to a sense, emotion or opinion (Cambridge and Oxford dictionaries online). The affective component of TDI is shown through two subcategories of adjectives and other words or composite words that express feelings and recommendations: Good feelings (positive adjectives and expressions such as "must see" and "don't miss") and bad feelings (negative adjectives and expressions such as "not so nice" and "not worth"). The subcategories of adjectives are constructed in advance from an expansion of the dichotomies of positively and negatively keyed items of bipolar affective quality scales (Russell & Pratt, 1980) and their synonyms and antonyms (Oxford, 2014). The recommendations emerge from the text itself (see Appendix).

RESULTS

This section starts by providing comparative results among the three different data sources (TA: TripAdvisor, OD: official dossier, and LP: Lonely Planet), and congruency analysis through compositional analysis, first at a general overview level (most frequent keywords) and then focusing on the three image components under analysis (spatial, affective and cognitive).

General overview: most frequently occurring keywords

The analysis of the most frequent keywords in each source of information shows that in absolute numbers the most frequent keyword in the three sources is "Barcelona", the capital city of Catalonia. However, in relative terms, it is much more frequently mentioned in the case of TA. After that, we observed that the most frequent keywords do not coincide in general in the three sources, and that there are more coincidences between LP and OD. For example, in TA, specific attractions in Barcelona such as Gaudi masterpieces "Sagrada Familia", "Park Guell", "Casa Batllo", or "Las Ramblas", "Camp Nou" or "Gothic quarter" are among the most mentioned keywords, whilst they do not

appear among the most frequent in the case of LP or OD. Similarly several words related to positive feelings appear in TA, such as “great”, “amazing”, “beautiful” and “nice”, while words related to feelings do not appear among the most frequent in the other two sources. Conversely, both in LP and OD sources the geographical and identity references of “Catalonia” and “Catalan” appear among the most frequent words, while reviewers do not mention them as frequently. Generic attraction words such as “museum” also appear in LP and OD. Remarkably, in OD source, some more generic attraction factors are mentioned most frequently such as “wine” or “heritage”, as well as the “quality” concept. These words are not present in the other two sources. Finally, LP focus more on words related to accommodations and practical issues such as “hotel”, “rooms” or “carrer”.

Table 2. Analysis of most frequent keywords

	% per keyword within data source			Contributions to distance between sources			Row sum
	LP	OD	TA	LP-OD	LP-TA	OD-TA	
Total number of Keywords (out of subcomposition of 50)	3903	1751	173827				
barcelona	11.555%	11.650%	47.359%	0.030	8.883	7.884	16.797
tour/s	2.280%	1.142%	7.696%	0.278	7.763	10.978	19.018
sagrada familia	0.436%	0.571%	6.775%	0.189	18.612	15.046	33.848
great	1.896%	2.456%	4.754%	0.179	6.195	4.268	10.642
gothic quarter/barri	0.589%	0.400%	3.075%	0.050	10.382	11.873	22.306
amazing	0.000%	0.000%	2.544%	0.906	38.203	27.342	66.451
park guell	0.154%	0.228%	2.495%	0.314	18.981	14.411	33.706
salou	0.000%	0.457%	2.474%	9.353	37.861	9.578	56.792
beautiful	0.615%	0.228%	2.214%	0.682	8.128	13.519	22.330
casa batllo	0.205%	0.343%	1.870%	0.460	14.292	9.624	24.376
place	2.255%	1.085%	1.695%	0.321	1.650	3.428	5.399
las ramblas	1.358%	0.286%	1.645%	1.946	3.103	9.963	15.011
camp nou	0.205%	0.286%	1.626%	0.246	13.257	9.892	23.395
nice	0.205%	0.171%	1.565%	0.000	12.980	13.088	26.069
experience	0.256%	0.514%	1.492%	0.741	11.102	6.107	17.950
best	1.691%	1.428%	1.490%	0.000	2.083	2.097	4.180
visit	0.641%	0.685%	1.442%	0.054	5.670	4.619	10.342
good	1.896%	0.628%	1.352%	0.884	1.518	4.719	7.121
museu/m	5.022%	3.255%	1.101%	0.072	0.003	0.103	0.179
bar	2.741%	0.000%	0.922%	13.942	0.230	17.755	31.927
free	2.306%	0.228%	0.827%	4.612	0.296	7.245	12.153
city	2.946%	5.483%	0.819%	0.617	0.084	0.246	0.946
new	0.794%	2.284%	0.753%	1.490	2.300	0.087	3.878
wine	1.281%	3.027%	0.426%	1.049	0.219	0.309	1.577
town	3.869%	0.742%	0.250%	2.209	1.371	0.100	3.680
world	0.615%	2.399%	0.236%	2.327	0.374	0.835	3.537
sant	2.716%	1.314%	0.179%	0.316	1.315	0.342	1.973
tourist	1.384%	7.767%	0.177%	3.571	0.236	5.640	9.447
hours	3.151%	0.228%	0.098%	6.051	3.621	0.310	9.983
catalonia	6.918%	10.908%	0.089%	0.384	7.737	11.568	19.689
hotel	3.587%	0.971%	0.072%	1.305	5.437	1.415	8.157
catalan	3.613%	4.740%	0.072%	0.190	5.508	7.745	13.443
plaça	3.075%	0.171%	0.067%	7.415	5.109	0.214	12.738
europe	0.436%	2.513%	0.065%	3.674	0.110	5.059	8.844
sights	2.613%	0.228%	0.061%	5.165	4.787	0.007	9.960
quality	0.461%	2.627%	0.049%	3.626	0.455	6.648	10.729
cultural	1.076%	2.399%	0.048%	0.933	2.351	6.246	9.530

sports	0.102%	2.456%	0.033%	11.161	0.185	8.471	19.818
year	0.717%	3.655%	0.024%	3.213	3.316	13.058	19.588
century	3.484%	1.028%	0.016%	1.116	14.771	7.767	23.654
destination	0.077%	2.456%	0.010%	13.166	0.189	16.510	29.865
offer	0.384%	4.397%	0.009%	6.769	4.957	23.311	35.037
rooms	3.075%	0.343%	0.009%	4.120	18.541	5.181	27.842
tourism	0.128%	7.025%	0.006%	17.378	2.068	31.435	50.881
heritage	0.154%	2.513%	0.005%	8.752	3.316	22.842	34.910
child	2.562%	0.000%	0.005%	13.442	22.583	1.179	37.204
carrer	7.891%	0.000%	0.003%	22.956	38.005	1.887	62.848
adult	3.203%	0.000%	0.002%	15.128	32.132	3.165	50.425
daily	2.408%	0.114%	0.002%	8.319	28.982	6.246	43.547
accommodation	0.974%	2.170%	0.001%	0.933	26.738	37.661	65.332
Column sum (% and Squared Aitchison's Distance)	100%	100%	100%	202.036	457.990	429.025	
Aitchison's Distance divided by number of dimensions				4.123	9.347	8.756	

Aitchison's distance shows the differences in using the keywords in relative terms between information sources, and it is interpreted as follows. Small distance means similarities between information sources; that is, in terms of keywords used, information sources behave similarly. Higher distance means differentiability between information sources. Each keyword contributes differently to differentiating information sources. TA differs from OD and LP, but using which words? Aitchison Distance is the sum of keywords' contributions. On the other hand, row sum indicates to which extent a keyword contributes to distinguishing information sources within them.

To interpret the table of differences between sources, we complemented the information regarding percentage of each keyword within each source and with the keywords' contributions to the distance between sources. The highest differences were found between LP and TA sources. The distance between these two sources was 457.99. The distance between OD and TA was 429.025, which is quite close to the previous one. Finally, the smallest difference was found between LP and OD (202.036). Focusing on differences between pairs of sources and keyword contributions, readers can observe that "Barcelona" is the most relevant word in the three information sources. It represents 47% of the total analysed words (50) in TA, while in the LP and OD sources, it represents 11.55% and 11.65%. However, it primarily contributes to differentiating LP from TA, and it does not contribute to differentiating LP from OD.

The words "carrer" (7.89% in LP), "tourism" (7.03% in OD) and "adult" (3.20% in LP) are the words which contributed most to differentiating LP from OD. Other keywords such as "amazing" (representing 2.54% in TA and 0% in the other two sources), "Camp Nou", "Casa Batllo", "Century", "Child", "daily", "experience", "Gothic quarter", "nice", "Park Guell", "rooms", "Sagrada Familia" (6.78% in TA) and "Salou" (2.47% in TA) made smaller contributions, but they mostly contributed to differentiating both LP from TA.

Within the OD source, the words "tourism" and "tourist" also have a relevant weight (around 7%), and the word "tourism" contributes highly to differentiating the OD from

the TA. Finally, “accommodation” (2.17% in OD and almost 0% in TA), “beautiful” (2.21% in TA), “Catalonia” (10.91% in OD), “destination” (2.46% in OD), “heritage” (2.51% in OD), “offer” (4.39% in OD), “tourism” (7.03% in OD), “tours” (7.7% in TA) and “year” (3.66% in OD) contributed primarily to differentiating OD from TA.

Spatial component

Table 3. Spatial component analysis

	% per brand within data source			Contributions to distance between sources			
Brands	LP	OD	TA	LP-OD	LP-TA	OD-TA	Row sum
Total number of pages (LP and OD) and number of reviews (TA)	122.4	44	80000				
Barcelona	57.190%	45.455%	83.083%	0.615	4.186	8.010	12.812
Costa Barcelona	2.696%	6.818%	2.230%	0.139	2.199	1.231	3.569
Costa Brava	16.340%	6.818%	7.090%	2.041	0.702	5.136	7.878
Costa Daurada	5.719%	6.818%	5.898%	0.143	2.901	4.335	7.380
Paisatges Barcelona	2.451%	6.818%	1.185%	0.220	0.895	0.228	1.342
Pyrennees	10.866%	6.818%	0.338%	1.042	3.237	0.606	4.885
Terres Ebre	1.225%	6.818%	0.078%	1.350	1.184	5.062	7.596
Terres Lleida	1.879%	6.818%	0.078%	0.539	2.297	5.062	7.899
Vall Aran	1.634%	6.818%	0.023%	0.764	6.826	12.157	19.747
Column sum (% and Squared Aitchison's Distance)	100%	100%	100%	6.852	24.427	41.828	
Aitchison's Distance divided by number of dimensions				0.857	3.053	5.228	

As shown in Table 3 (brands analysis), distances between LP and TA, and between OD and TA, data sources are smaller (0.857, 3.053 and 5.228) than in Table 2 (keyword analysis). This is mainly because distance grows greater as the number of dimensions increases (as it happens with Euclidean distance).

When it comes to analysing the spatial component of image, the greatest difference or gap between information sources is the one between OD and TA sources (41.828), and the brands which most contribute to differentiating these two sources are Vall d'Aran and Barcelona. The lowest distance between sources was 6.852, which was the difference between LP and OD.

Regarding percentage of appearance within sources, how differently these three sources talk about the Catalan brands is demonstrable. For example, the OD dedicates the same space to all brands, except for Barcelona, to which dedicates almost half of the space (45.45%), while LP dedicates more than half of the space to the brand of Barcelona (57.19% of the space). However, the percentages dedicated to Costa Brava (16.3) and Pyrenees (10.9) are quite relevant too.

Finally, out of all OTR's analysed from TA, 83% were about Barcelona, and only 7% were about Costa Brava and 5.9% are about Costa Daurada. The other brands were almost not mentioned in TA.

Affective and cognitive component

LP and OD sources used very few feeling words. Conversely, in the case of the TA source, 5.5% of the total words were feelings. The highest distance between sources regarding the use of feelings was between OD and TA (2.970), followed by the distance between LP and OD (2.289). There was almost no difference between LP and OD regarding the use of feeling words.

Table 4. Affective and cognitive component analysis

	% per category within data source			Contributions to distance between sources			
Affective analysis	LP	OD	TA	LP-OD	LP-TA	OD-TA	Row sum
Total number of words	107668	29852	858106				
Feelings yes	0.685%	0.509%	5.533%	0.022	1.145	1.485	2.652
Feelings no	99.315%	99.491%	94.467%	0.022	1.145	1.485	2.652
Column sum (% and Squared Aitchison's Distance)	100%	100%	100%	0.044	2.289	2.970	
Aitchison's Distance divided by the number of dimensions				0.044	2.289	2.970	
Total number of words	737	152	47475				
Feelings good	91.723	99.342	96.838	1.706	0.258	0.636	2.600
Feelings bad	8.277	0.658	3.162	1.706	0.258	0.636	2.600
Column sum (% and Squared Aitchison's Distance)	100%	100%	100%	3.411	0.517	1.273	
Aitchison's Distance divided by number of dimensions				3.411	0.517	1.273	
Cognitive analysis							
Total number of words	107668	29852	858106				
Gaudi yes	0.097	0.251	2.878	0.229	2.929	1.519	4.677
Gaudi no	99.903	99.749	97.122	0.229	2.929	1.519	4.677
Column sum (% and Squared Aitchison's Distance)	100%	100%	100%	0.458	5.857	3.039	
Aitchison's Distance divided by the number of dimensions				0.458	5.857	3.039	

Further analysing words expressing feelings, we classified them into good and bad feelings. We were also able to observe relevant differences between information sources. In this case, the main difference was between OD and LP (3.411), which used 91.7% and 99.3% good-feelings words, respectively. The distance between OD and TA is quite relevant too (1.273). In this case, the gap between LP and TA was the smallest, meaning both sources expressed themselves similarly in terms of feelings.

Finally, to analyse the cognitive component of image, we focused on a specific element of interest, which the general overview showed was very relevant in the case of TA: Gaudi's masterpieces. Thus, we classified the words appearing in the three sources based on whether they made reference to Gaudi's heritage. As observed in Table 4, in TA, 2.88% of words analysed were related to Gaudi's architecture, which shows this element of the cognitive image of the destination is very prominent. In this case, the

main distance between information sources is between the LP (which barely makes reference to Gaudi's work) and TA sources (5.857).

Results summary

As mentioned above, in order to homogenize Aitchison's distances and to be able to compare the analysis of the most frequent keywords with the analysis of TDI components, we have computed the gap between information sources (Table 5) by dividing the Aitchison's Distance by the number of dimensions included in each analysis (49 in the general overview with most frequent keywords, 8 in the spatial analysis, and 1 dimension in the affective and cognitive analyses).

Table 5: Aitchison's distance divided by D-1 in each analysis

		LP-OD	LP-TA	OD-TA
General overview	Analysis of most frequent keyword	4.123	9.347	8.756
TDI components	Spatial analysis	0.857	3.053	5.228
	Analysis of the use of affective words	0.044	2.289	2.970
	Analysis of good and bad feelings words	3.411	0.517	1.273
	Cognitive component analysis	0.458	5.857	3.039

We can see that the difference between autonomous (LP) versus organic (TA), and induced (OD) versus organic information sources when analysing the most frequent keywords used is much higher than when analysing TDI components. But, the difference between autonomous and induced images is smaller.

CONCLUDING REMARKS

This analysis has contributed to existing literature by proposing a novel methodology for assessing TDI gaps between projected and perceived images in relation to the destination image components (cognitive, affective, and spatial), and actually measuring quantitatively the image gap or distance between various online information sources (induced: NTO, autonomous: Lonely Planet guidebook, and organic: 80,000 TripAdvisor OTRs), in general and according to the different image components. The sample of dozens of thousands of visitors' opinions about attractions and services in Catalonia largely represents the TDI perceived as a whole. In relation to previous works, the main contribution of this study is the actual quantification of the gap, in this case among the three selected information sources, and the massive analysis of TGC (big data). As shown in Table 5, we found the greatest gap between autonomous and organic sources in the general overview analysis, and the smallest gap between autonomous and induced information sources in the use of affective words.

Moreover, this study not only compares a variety of destination image components using a wide range of image sources but also uses a more appropriate technique to do so. Using compositional analysis to measure the gap of TDI between information sources, instead of computing the differences directly between proportions without taking into account the proportional distance, represents a relevant methodological contribution. Computing the contribution to differentiating information sources (row

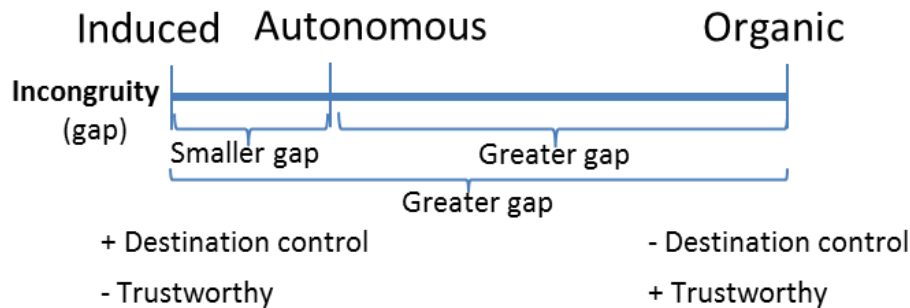
sums), we have seen that the word “accommodation” is one of the most differential words when using compositional analysis; however, it may be one of the least differential words when subtracting the proportions (computing difference between proportions) directly. Conversely, the words “Barcelona” and “Sagrada Familia” would appear as the most differential words between information sources. While using compositional analysis, they appear as unremarkable contributors to differentiating among the sources. It is the same in spatial analysis with the brand Val d’Aran, which is the brand which contributes the most to differentiating sources but is almost not present in the organic information source.

Additionally, the proposed method confirms the idea of TDI multidimensionality (Gallarza, Gil Saura & Calderón García, 2002) and its temporal and spatial variability, and enabled its measurement by analysing TDI both from an overall and a fragmented perspective, and assessing the combination of the image components, information sources and the projected vs. perceived image dichotomy. In different destinations, TDI congruity may vary according to all these dimensions.

Moreover, at a theoretical level, these findings suggest several implications concerning Gartner’s (1993) classification of information sources. These results support and validate Gartner’s classification of information sources and add an extra dimension to his classification: the (in)congruity or gap between sources (Figure 2). This research found that the congruity between the images held by different information sources generally coincided with the classification proposed by Gartner, which is based on control of the TDI held by the information source, by the destination and perceived trustworthiness. We found a coincidence with this classification in that the greater image gap or incongruity was actually found between the induced source (the most controlled and least trustworthy) and organic (not controlled by the destination and the most trustworthy), or between the autonomous source (half-way in control and trustworthiness) and the organic, according to Gartner’s classification. Consistent with this classification, autonomous sources demonstrated a greater congruity with the induced source.

However, the implication for the classification of information sources goes even further, as the distance between sources has been found to be very different and variable. Our results show that organic images (perceived images) are much different from the rest (projected image), and that the distance of this source of information to the rest is much greater. Results also show that induced and autonomous sources (projected image) resemble one another much more. This relationship may vary across destinations, image components or periods of time.

Figure 2. Proposed model of representation of TDI information sources, introducing the measurement of the incongruity dimension



Source: Authors, inspired by Gartner (1993)

As far as managerial implications are concerned, the three analysed image sources are the most representative **of the** tourist information sources in the case of Catalonia. Therefore, their similarities and differences may exert a strong influence on destination image formation. According to marketing theory, **the closer the projected images of a destination are to tourists' perceived images, the more likely they are to meet tourists' expectations (Marine-Roig, 2015) and to build strong, coherent brands.** In this case, the image expressed by tourists online (UGC) is eminently different from **that provided by** other sources of information. In **a** context where UGC is increasingly influential, **this means that the image reflected by UGC** will increasingly become the image other users will perceive. **In this respect, destination managers should consider tourists' views when determining which groups to target with marketing policies and should seek the cooperation of other key stakeholders (i.e., tourism services providers) projecting images in order to advance toward a more congruent image. Managing the issue of image (in)congruity between tourist representations is important not only in terms of marketing purposes, as it may affect the transformation of the reality of destinations at social, cultural, economic, and even physical levels (Kim & Richardson, 2003; Xiang, Wober, & Fesenmaier, 2008), but, in addition,** it has been argued that **an** induced image is the most faithful to the reality of the destination, in contrast **to an** organic image (which is person-determined) (Mackay & Fesenmaier, 1997).

In this context, the knowledge of the perceived image and of its incongruence with projected image can be useful for NTO and other DMO to improve planning, branding, positioning and promotion of the tourist destination. **In this respect, this research responds to the premise that what cannot be measured cannot be managed, and what cannot be managed cannot be improved, by providing an effective method to measure destination image gaps quantitatively, which can serve to drive continuous improvement in management policies.** The actual quantification of the gap between projected and perceived images implies that the marketing policies of destination gap bridging can be assessed and measured quantitatively to determine whether they are working **in different aspects and periods of time.** And, this quantitative measurement is not only between projected and perceived images, but also among different information sources. Furthermore, the proposed method enables examination of the width of the image gap in terms of different components of image and/or elements of interest. Destination managers should identify the elements of interest or components of their brand, be aware of existing image gaps and how wide they are, and **understand** in what components **s** or elements **s** they are greater in order to direct their

efforts and strategies to building a congruent and comprehensive destination image. One possible way for DMOs to achieve a more congruent image could be to integrate organic images, especially from UGC, in their official promotional materials while continuing to pursue their promotional goals.

It is worth noting that the proposed method is not complex and computations are straightforward; therefore, it could be applicable to real life situations for managers and analyses could be elaborated upon further in the future. If this analysis was replicated for another year, it would be clear whether the gap actually widened or reduced, and how much.

Limitations and future works

Even though this study has worked with the most representative information sources of each type (induced, organic and autonomous) and has proposed a novel approach to quantify the gap between them, it does present some limitations.

A main limitation concerning opinion mining is that the automatic analysis of feelings or sensations is based on a feelings lexicon. This may entail some limitations, as it does not account for irony, some language turns or typographical alterations, and some details may be lost. Furthermore, concerning the affective component of the image, some feelings may be controversial; for example, a relaxing destination (a positive feeling) for a tourist can be boring (a negative feeling) for another.

Regarding methodology and the selection of keywords, this study is limited in terms of having selected the 25 keywords of each source (and working with a subcomposition), that is, drawing from what is presumably and a priori more important and what will contribute more to differentiate between sources. Future studies could also include the least frequent words or select words after the keyword count analysis, and observe which of the least frequent words contribute the most to differentiate information sources. Also, future studies could draw from what matters and is important, as well as is much different. In other words, future studies could identify those cases which are equally represented and those which are not equally treated in the three information sources.

Another limitation of this study on a territorial basis is that in Trip Advisor there are three territorial brands (tEbre, tLlei i vAran) which are of negligible weight within the sample, and together represent less than 0.2 % of the total. In this respect, future works should compare results by different countries or destinations.

As far as information sources used is concerned, in further research the analysed sources of projected/perceived TDI can be extended and results can be compared using different languages, visitor nationalities, and duration at destination, etc. Future studies should also study the actual distances or (in)congruity between several information sources to see whether Gartner's (1993) relationship is maintained or how it changes according to different destinations, image components and time. Moreover,

future analyses could distinguish first-time visitors from repeat visitors to see how destination familiarity affects results.

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Pending

Appendix

Affective keywords in the case study

- *Positive recommendations*: do not miss; don't miss; have to see; must do; must go; must see; must visit; must-do; must-see; must-visit; not to be missed; not to miss; recommend; recommended; unmissable
- *Negative recommendations*: avoid; be careful; beware; can't recommend; do not go; don't bother; don't do; don't go; don't take; not a must; not recommended; nothing to see; wouldn't recommend
- *Good feelings*: agreeable; amazing; amazingly; amiable; amused; astonishing; awesome; beautiful; beautifully; beauty; best; better; brave; breathtaking; brilliant; calm; charm; charming; cheerful; chilled out; clean; colorful; colourful; comfortable; comfy; cool; cooperative; cosmopolitan; courageous; cute; delicious; delighted; delightful; divine; eager; educational; elated; elegant; enchanting; encouraging; energetic; enjoy; enjoyed; enriching; entertaining; entertainment; enthusiastic; excellence; excellent; excited; exclusive; exquisite; extraordinary; exuberant; fabulous; fabulously; faithful; famous; fantastic; fascinating; favorite; favourite; fine; first class; freedom; friendly; fun; funky; funniest; funny; gem; genial; gentle; glad; glorious; good; gorgeous; graceful; gracefully; grand; great; happy; healthy; heavenly; helpful; highlight; hilarious; ideal; imposing; impressed; impressive; incredible; inspiring; interesting; jewel; jolly; joyous; kind; lively; love; loved; lovely; loving; luckily; lucky; magic; magical; magnificent; majestic; marvel; marvellous; marvelous; never disappoints; nice; nicely; okay; organised; outstanding; overwhelming; paradise; passion; passionate; perfect; perfection; picturesque; pleasant; pretty; professional; quaint; quality; relax; relaxed; relaxing; relieved; respectful; rich; romance; safe; silly; smiling; spectacular; speechless; splendid; staggeringly; stunning; stunningly; sublime; successful; super; superb; terrific; thankful; thoughtful; tidy; top class; top-class; tranquil; unbelievable; unforgettable; unique; unspoilt; vibrant; victorious; vivacious; welcomed; witty; wonder; wonderful; worth; wow; yummy; zany; zealous
- *Bad feelings*: abandoned; alienating; angry; annoyed; annoying; anxious; arrogant; ashamed; avoidance; avoided; awful; awkward; bad; badly; bizarre; bland; bored; boring; bummer; bumpy; busy; cesspit; chaotic; cheesy; clumsy; condemned; confused; crap; crappy; crazy; creepy; crime; criminally; crowded; crowds; cruel; dangerous; death; deceptive; defiant; depressed; depressing; derelict; dirty; disappointment; disappointed; disappointing; disaster; disastrous; discrimination; disgraceful; disgusted; disgusting; disorganised; disrespectful; disturbed; dizzy;

dreadful; dull; embarrassed; envious; evil; exhausted; expensive; faded; fierce; filthy; foolish; frantic; freaky; freezing; frightened; frustration; got lost; grieving; grumpy; hard time; hated; hateful; hazard; helpless; homeless; homesick; hopeless; horrible; horror; hungry; hurt; ill; incompetent; incomprehensible; insanelly; itchy; jealous; lacking; lacklustre; lame; lazy; lie; lies; lonely; looted; lost; loud; mediocre; miserable; misinformed; mistake; mugged; mysterious; nasty; naughty; neglected; nervous; never again; nightmare; not a good; not a must; not friendly; not fun; not good; not great; not helpful; not interesting; not nice; not perfect; not respectful; not so friendly; not so good; not so interesting; not so nice; not very good; not very happy; not very nice; nutty; obnoxious; odd; off putting; off-putting; outdated; outrageous; overcharged; overcrowded; overpriced; overrated; oversold; pathetic; pick pockets; pickpocket; pickpockets; pitiful; poor; poorly; problem; problems; pushy; racist; repulsive; ridiculous; ripoff; rip-off; robbed; robbery; rubbish; rude; rudeness; ruined; sad; saddest; scam; scammers; scary; scruffy; selfish; shambolic; shameful; shocking; sick; snobby; sore; spoiled; spoilt; steal; stinky; stolen; strange; stressful; strike; stupid; tacky; tedious; terrible; terribly; testy; thief; thieves; thoughtless; tired; tourist trap; touristy; troubled; ugliest; ugly; uncomfortable; understatement; unfortunate; unfortunately; unfriendly; unhappy; unimpressed; uninteresting; unkempt; unpleasant; unprofessional; unsafe; unwelcome; upset; uptight; useless; vandalism; vandalized; vandals; wacky; waste; weary; weird; wicked; worried; worse; worst; wrong; yuck

The frequency tables have been generated in near-real time using Marine-Roig's (2017) algorithm, which was implemented with Java. In the case of overlap, the algorithm gives priority to composite keywords. For example, "not worth" (two words) has preference over "worth" (simple word) and over "not" (stop word). Between two composite keywords, the first one in the list takes precedence.

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